

- 1.
- (a) (i) A- incomplete metamorphosis 1
B-complete metamorphosis **BOTH**;
- (ii) X- {nymph/ larva/ instar}
Y- pupa (accept chrysalis/ cocoon/ pupal stage) **BOTH**; 1
- (b) (Exoskeleton is) {rigid/ hard/ non- living/ does not grow/ owtte}; 3
They shed (the exoskeleton)/ ecdysis/ moult;
Then grow (a new one)/ allows growth/ vulnerable whilst
hardening ;
- (c) Fluid filled cavity (surrounded by a membrane);
{Protective/ hard/ leathery} {shell/ outer covering/ coat};
(embryo within) yolk sac/ food store/ yolk for nutrition/ own 2
internal nutrient supply; [any 2]
- (d) (the young are retained) for a {considerable/ longer} time in the
mother's womb or uterus;
(The embryo is) nourished there from {the mother's blood
supply /the placenta}/ {unlimited nutrients/ OWTTE}; 3
Protection – qualified;
The young are {born in a relatively advanced state of
development/ well developed/ more advanced growth in
womb}; [Any 3]
NOT parental care/ ref to number of offspring
- Question 4 Total [10]**

2.

(a) 1 mark each correct ROW

4

Statement	Fish	Amphibia	Reptiles	Birds	Mammals
1. Fertilisation is always internal			✓	✓	✓
2. Eggs are laid in an aquatic environment	✓	✓			
3. The embryo is surrounded by a membrane called the amnion			✓	✓	✓
4. Both fertilisation and embryo development are always internal					✓

(b) (i) lowest supply of {nutrients / food}; max 2

embryo cannot complete development inside egg/ {poorly/less}

developed at hatching;

embryo unable to care for itself after hatching / parents have to {feed

/ keep warm} (due to lack of feathers)/ cannot feed itself;

(ii) more {time / energy/ resources} used to care for offspring/ more 2

offspring would need too much {time / energy/ resources} to look after;

increased chance of survival of offspring/ less competition between offspring;

(c) (i) incomplete metamorphosis NOT stage metamorphosis 1

(ii) nymphs / instars 1

(iii) nymphs {go through a series of moults/ shed exoskeleton several 3

times} (to become the adult); NOT skin/ outer layer

exoskeleton is {hard/ limits growth};

exoskeleton can only {be stretched/ grow} when newly formed/

{length/ size} can only increase following a moult;

rapid increase in length before exoskeleton hardens

(d) Tracheae/ tracheoles; NOT trachea 1

spiracles 1

Question Total 15

3.

- (a) (i) Incomplete metamorphosis 1
- (ii) 1 egg } 1 mark for both (not: zygote)
7 adult/imago }
2-6 nymphs (allow: instar) 2

- (b) (i) Complete metamorphosis 1
- (ii) A Egg
B Larva (allow: maggot)
C Pupa (allow: chrysalis / cocoon)
D Adult/Imago 2

(1 mark per pair) Any 2 per mark

Total 6 marks

- 4.
- (a) (i) Meiosis (correct spelling).
(ii) Fertilisation.
(iii) Zygote. (allow: mitosis)
(iv) Mitosis. (correct spelling)
- [4 correct = 2, 3 correct = 1] 2
- (b) X - haploid, Y - diploid. 1
Colonise area quickly/reduce parasite transmission
- (c) (i) Rapid increase in numbers/energy for mating is saved/where
environment is stable/ useful features maintained. 1
(not: its quicker/one parent needed/clones)
- (ii) Variation/variety in offspring needed to adapt to new conditions or
example/survival advantage; 1
(sexual reproduction) leads to variation. 1
- (d) (i) Joining together gametes/fusing of sperm and eggs (sperms
introduced) inside (female's) body/reference to intromittent organ. 1
(not: zygote formation)
- (ii) Reduced number of gametes produced/more chance of gametes
meeting/fertilisation/less chance of gametes being wasted;
allows (male) gamete to become independent of water ref. prevent
dehydration;
embryo/zygote can be better protected; (not: it/offspring/baby)
resistant stage in life cycle/ref. shelled egg. (any 3) 3
- (iii) Embryo can receive nutrition during development. 1

10 MARKS

5.

(a) **Advantages**

Variation/genetically different;

allows development of a resistant stage in life cycle;

seeds, spores, larvae allow dispersal

(Max 2)

[2]

Disadvantages

Need two individuals/parents; a slow form of reproduction / asexual much faster;

some variations not as successful as parent type/mutations more common/inherit genetic disorder;

need to get gametes together; ref large numbers

(Max 2) (not: ref disease/complex/less successful unequal)

[2]

(b) Less gametes wasted/increased chance of fertilisation:

gametes become independent of water;

fertilised egg can be enclosed in a protective layer; allows fertilised egg to develop inside body of female (where it is nourished and protected);

gametes do not dehydrate;

(Max 2)

[2]

(c) Life cycle rapid; Food store in seed allows rapid growth of embryo; food store enables seed to survive for long periods of time/ref dormancy;

protection by testa/resistant outer layer;

leaf fall recycling of nutrients; no need for water for fertilisation; ref link with animals or wind for pollination; ref dispersal e.g. fruit; large numbers of seeds produced.

(Max 3) (not: ref reproduction asexual and sexual)

[3]

Essays

1.

- A plants have well established root system/ OWTTE;
- B leaves are thin/ large SA for photosynthesis/ gas exchange;
- C {waxy cuticle/ shed leaves in winter} to reduce water loss;
- D {stomata/ guard cells} to {control/ reduce} water loss;
- E xylem transport water;
- F phloem transports organic solutes/ amino acids;
- G xylem/ tracheids provide structural support;
- H brightly coloured {flowers/ petals/ scent/ nectar} to attract insects;
- I Adaptation of pollen to insect pollination e.g. sticky/ hooks;
- J large amounts and small sized pollen grains for wind pollination
- K pollen grains have hard coats to prevent desiccation;
- L no requirement for gametes to travel through water/ fluid;
- M resistant {coat/shell} around the seed to {withstand adverse conditions/ protect};
- N food store in seeds;
- O embryo develops in seed until {germination/ leaves are produced} (above ground);
- P seed dispersal adaptations/ appropriate example

2.

- A reproduce by mitosis;
- B genetically identical/clones;
- advantages*
- C less chance of mutation;
- D adapted to same conditions as parents/ owtte;
- E parent can provide support until independent;
- F example of asexual reproduction: strawberry/other appropriate named example;
- G no need for (second organism for) fertilisation/ only one parent is needed;
- H no wastage of gametes/ less energy wasted;
- I rapid increase in numbers/ large numbers produced;
- J no special mechanisms required;

disadvantages

- K lack of genetic variation {means more susceptible to wiping out/ less able to adapt};
- L (means more susceptible to wiping out) by disease;
- M (less able to adapt) environmental changes;
- N no chance of evolution/natural selection;
- O less chance of dispersal/ restricted to one niche;
- P more competition for resources;

3.

(i) Fish/ amphibians	<ul style="list-style-type: none"> A. Fish/ amphibians show external fertilisation; B. Fertilised {egg/ zygote/ embryo} develops outside body of parent; C. Many eggs/ young produced; D. Ensures some survive;
	<ul style="list-style-type: none"> E. Reptiles / Bird / Mammals internal fertilisation; F. This allows gametes to be independent of water; G. Increased chance of fertilisation/ fewer gametes {needed/ wasted};
Reptiles/ birds	<ul style="list-style-type: none"> H. (Evolution of an) amniote egg; I. eggs surrounded by protective shell/ preventing dessication;
mammals	<ul style="list-style-type: none"> J. Birds incubate eggs outside mothers body; K. Mammals – development inside mothers body; L. Nutrients/ oxygen via placenta; M. Young born well developed; N. Birds/ mammals exhibit parental care; O. Relationship between parental care and number of offspring produced;
	<p>Question 7 Total</p>
	<p>[10]</p>

4.

- A. Reference to Asexual **and** sexual;
- B. Asexual produces offspring that are genetically identical / clones;
- C. By mitosis;
- D. Allows (rapid) colonisation in favourable / stable conditions
OR outcompetes (slower) sexual reproduction;
- E. But if conditions / or e.g. such as temp change / unstable or disease occurs;
- F. All individuals may die / none may have resistance / species may not be able to adapt;
- G. Sexual reproduction produces offspring that are genetically different;
- H. (Gametes) produced by meiosis;
- I. Genetic variability allows a species to adapt to environmental change / evolution;
- J. Slower/needs a partner (usually) / asexual faster;

7 Max

- K. Relationship with animals / insects for pollination;
- L. Relationship with animals / insects for seed dispersal;
- M. Pollen can survive dessication / without water;
- N. Seed with stored food enables the embryo plant to grow until leaves form / are exposed to sunlight;
- O. Seed has a resistant (coat) to withstand adverse conditions;

3 Max

Question total 10

5.

- A. Gametes are shed in water [1]
- B. and fertilisation is external. [1]
- C. Heavy waste of gametes which fail to fuse. [1]
- D. Embryo is entirely dependent on yolk supply for its development. [1]
- E. Many hazards – predation etc, - large waste of embryos. [1]
- F. Finding suitable conditions for development is a completely random process. [1]
- G. Terrestrial mammals have internal fertilisation. [1]
- H. Placing of gametes/female gametes not shed. [1]
- I. Greater certainty of fertilisation. [1]
- J. Number of eggs has been much reduced. [1]
- K. Internally developing embryo not dependent solely on yolk / importance of placenta. [1]
- L. High level of protection from external hazards during development. [1]
- M. In general more time / energy / resources devoted to fewer offspring. [1]
- N. Contact between parent and offspring; parental care [1]
- O. e.g. provision of dens/burrows/herding/ protection from predation etc. [1]

[Ten marks can be awarded from the fifteen available]